New Zealand Continuous GPS Network

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Introduction

Years 2001 and 2002 have seen a major increase in the number of continuous GPS (CGPS) stations in New Zealand. This is due to a Land Information New Zealand (LINZ) project (PositioNZ) that has seen 12 new CGPS stations installed in the North Island by GNS. During 2003 and 2004, GNS will install a similar density of sites in the South Island, as well as few additional ones in the North Island.

In addition to the LINZ project, some 80 continuous sites will be installed over the next 5 years as part of the GeoNet project operated by GNS and funded primarily by the New Zealand Earthquake Commission (EQC). These stations will be sited to provide detailed measurements of tectonic deformation related to the Hikurangi subduction zone, and volcanic/tectonic deformation within the Central Volcanic Region.

For more information on the GeoNet project, see www.geonet.org.nz. For more information on the LINZ PositioNZ project, see www.linz.govt.nz/positionz.

Data Availability

Data from a subset of the New Zealand stations will be submitted to IGS from 2003, and all the New Zealand continuous data are publicly available from the GeoNet ftp site, ftp.geonet.org.nz/gps/rinex/. IGS-style site logs are stored at the same site in directory gps/docs/site_log/. Data from the PositioNZ sites are also available through the LINZ web site. Some of the New Zealand continuous data are already contributed to the Scripps Orbit and Permanent Array Center (SOPAC, garner.ucsd.edu), and we expect that all the data will become available at this site in the future.

The stations to be submitted to the IGS from 2003 are:

- AUCK and CHAT, as at present
- WGTN, HOKI and MQZG (which have been contributed for a number of years to the Asia-Pacific Regional Geodetic Project)
- NPLY

One additional South Island site (probably the new Otago University station – see below) will also be contributed to IGS after the South Island stations are installed.

Of these sites, NPLY is more-or-less on the Australian plate, MQZG and Otago University are more-or-less on the Pacific plate, and WGTN and HOKI are within the plate boundary deformation zone.

Present Status of Network

The New Zealand continuous GPS network at June 2003 is shown in the Figure 1, and the following sections provide notes on some of the stations.

AUCK and CHAT

AUCK and CHAT are the original New Zealand IGS stations, installed in 1995 in partnership between GNS, LINZ, JPL, and UNAVCO. These are the only New Zealand stations whose data are presently submitted to the IGS. Both stations were upgraded from Turborogue SNR-8000 receivers to Ashtech Z-12 CGRS receivers during 2001.

Sea Level Network

Since about 2000, GNS and Otago University have operated CGPS receivers at four of New Zealand's longest-running tide gauges. These are stations DUNT, LYTT, WGTT, and TAKL on the figure. Funding for this network is from the New Zealand Foundation for Research, Science and Technology (FRST). The data from these stations are contributed to the IGS TIGA pilot project, together with data from nearby high-quality stations OUSD, MQZG, WGTN and AUCK.

Southern Alps Network

The Southern Alps network (QUAR, KARA, WAKA, CNCL, NETT, HORN and MTJO) is primarily aimed at measuring the distribution of vertical motion across the Southern Alps in order to better understand processes of continental collision. (Note that only QUAR and MTJO are labelled on the figure.) The experiment started in February 2000 and will run at least 5 years. It is a joint project between MIT, the University of Colorado, Otago University, GNS, and UNAVCO. The funding source is an NSF grant to Peter Molnar (with U.S. co-investigators Brad Hager and Tom Herring), with the New Zealand institutions funded initially by an Otago Research Grant and now by FRST. As well as the continuous stations, a number of "semi-continuous" stations are operated for several months per year. After 3.5 years, this network has been able to measure a vertical motion profile across the Southern Alps with vertical rate uncertainties better than 1 mm/yr (1 s) from both the continuous and semi-continuous stations.

Otago University station

OUSD is the longest-running CGPS station in New Zealand, dating from January 1995 some 8 months before AUCK and CHAT were established. This station is located on the roof of a building, and it is planned to install a new bedrock station nearby during 2003-04. The old and new sites will then be run in parallel for a considerable time period.

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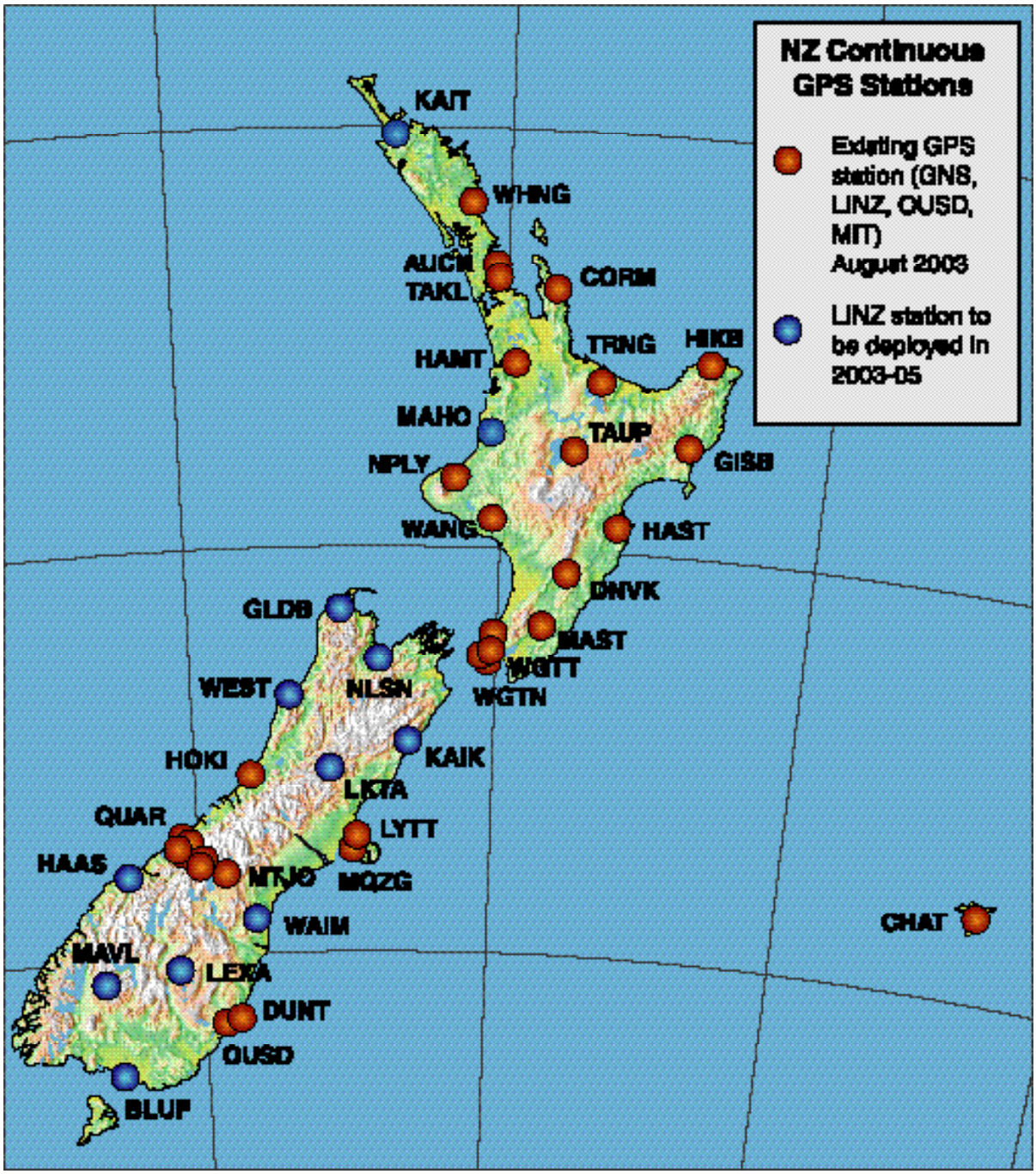

Figure 1. The New Zealand continuous GPS network at June 2003